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Remarks/Arguments

Claims 2-7, 11, 12, 14-17, 23 and 25-29 have been withdrawn from consideration. New claim 30 has been added. As a result, claims 1, 8-10, 13, 18-22, 24 and 30 remain pending and under examination in the application.

Applicant affirms the previous provisional election to prosecute the invention of Group I and the species set forth on page 4 of the Office Action mailed 23 June 2006. According to the Examiner, the elected invention and species involve claims 1, 8-10, 13, 18-22 and 24. However, Applicant respectfully submits that claim 6 also reads on the elected invention and species. In particular, Applicant notes that 1,2,4-benzenetricarboxylic anhydride is included in the Markush group of carboxylic anhydrides set forth in subsection (a) of claim 6 and that 1,2,4-benzenetricarboxylic anhydride is an alternative name for trimellitic anhydride. New claim 30 also reads on the elected invention and species.

Applicant traverses the rejection of claims 1, 8-10, 13 and 18-21 under 35 U.S.C. Section 102(b) as being anticipated by Myachajlowsky et al. (U.S. Pat. No. 5,552,254). Reconsideration and withdrawal of the rejection are respectfully requested in view of the following remarks.

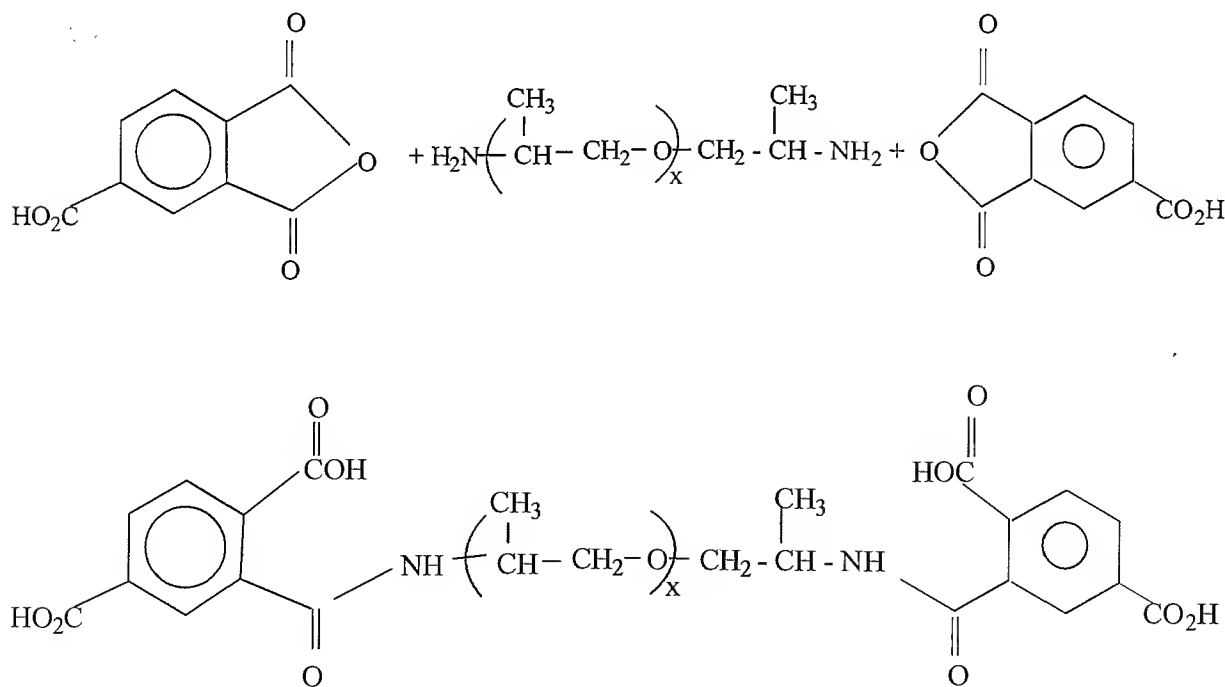
The Myachajlowsky reference is concerned with polyamic acid resins that are polymeric in character, i.e., resins that contain a plurality of repeating units derived from the starting reactants (monomers). The polymeric character of the reference polyamic acid resins is confirmed by the disclosure at Column 4, lines 15-18, of the Myachajlowsky reference: "The aforementioned amic acid based resins exhibit in embodiments a number average molecular weight of from about 2,500 grams per mole to about 100,000 grams per mole, as measured by vapor phase osmometer..." As pointed out by the Examiner, the resins described in the Myachajlowsky reference may be prepared using starting materials similar to those employed by Applicant to synthesize the polycarboxy-functionalized prepolymers that are the subject of the claims currently under examination in the present invention. However, Applicant controls the conditions under which these reactants are combined such that prepolymers, and not polymeric resins as in the Myachajlowsky reference, are produced. In the Myachajlowsky reference, approximately equimolar

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amounts of dianhydride and diamine are reacted to prepare the polyamic acid resins (see Column 7, lines 6-20 and 32-45, wherein it is taught that about 0.95 to about 1.05 mole dianhydride should be reacted with 0.95 to about 1.05 mole of flexible diamine). As is well known in the condensation polymerization field, such stoichiometries are used in order to obtain a relatively high molecular weight product wherein multiple repeating units of the initial reactants are linked together in a polymeric chain. In contrast, Applicant obtains prepolymers by reacting a large molar excess of the anhydride reactant with the diamine reactant such that, in general, one molecule of the anhydride reactant is attached to each end of the diamine reactant and chain extension is avoided.

This key difference may perhaps be more readily understood by referring to the model reaction sequence below wherein two moles of trimellitic anhydride are reacted with one mole of an amino-terminated polypropylene glycol to obtain a polycarboxy-functionalized prepolymer in accordance with Applicant's invention:



Applicant also wishes to point out that the Myachajlowsky reference requires the use

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of a dianhydride (or tetraacid) monomer and does not teach or suggest the use of a monoanhydride reactant such as trimellitic anhydride, corresponding to the species currently elected for prosecution in the present invention. See Column 3, lines 37-65, Column 4, lines 40-56, Column 7, lines 11-15 and 37-42, Column 7, line 58 through Column 8, line 11 of the Myachajlowsky reference.

Applicant traverses the rejection of claims 1, 9, 10, 13, 18, 19 and 21 under 35 U.S.C. Section 102(b) as being anticipated by the Journal of Polymer Science, B: Polymer Physics article by Lei et al. (hereinafter referred to as the "Lei Article". Reconsideration and withdrawal of the rejection are respectfully requested in view of the following remarks.

The Lei Article discloses 1:1 copolymers of benzenetetracarboxylic dianhydride and poly(tetramethylene oxide) glycol or poly(ethylene oxide) glycol (Abstract). That is, the aforementioned materials are combined and reacted in a 1:1 molar ratio to yield a polyester acid that is polymeric in character. The polymeric nature of the reaction products is evident from the structural formula set forth in Scheme 1 of the Lei Article. As explained previously, Applicant's invention is directed to prepolymers obtained by reaction of a molar excess of a polycarboxylic compound containing at least three carboxy groups (e.g., trimellitic anhydride) with an active hydrogen-functionalized elastomeric polymer. The Lei Article thus does not teach or make obvious the polycarboxy-functionalized prepolymers claimed by Applicant.

Applicant traverses the rejection of claims 1, 8-10, 13, 18-22 and 24 under 35 U.S.C. Section 103(a) as being unpatentable over Japanese Patent No. 2000-75484 ("Japanese '484") and Japanese Patent No. 2002-338929 ("Japanese '929"). Reconsideration and withdrawal of the rejection are respectfully requested in view of the following remarks.

The abstract from the Patent Abstracts of Japan for Japanese Patent No. 2000-75484 refers to "a resin having amido bonds, oxyalkylene groups and carboxyl groups". It is unclear from this description what the full structure and nature of such a resin might be, and thus the abstract alone is certainly not sufficient to make obvious the specific polycarboxy-functionalized prepolymer which is the subject of Applicant's claims. However,

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the Chemical Abstracts entry for this reference does mention a “Jeffamine D-2000-trimellitic anhydride copolymer” (emphasis added). Alternative Chemical Abstracts names for such a substance are also listed, both of which include the term “polymer”. Thus, although Japanese Patent No. 2000-75484 does propose the use of reactants similar to the elected species of compounds utilized in the synthesis of Applicant’s polycarboxy-functionalized prepolymers, the reaction product which is the objective of the reference is a polymer. A worker of ordinary skill in the art would not find it obvious to change the manner in which such reactants are combined in order to instead obtain a prepolymer, rather than a polymer. In particular, since the objective of the reference involves the use of polymeric materials, he or she would not have had any incentive or motivation to avoid achieving polymerization of the starting materials.

Similarly, Japanese Patent No. 2002-338929 describes polyimide precursors derived from aromatic tetracarboxylic dianhydride and an alkylendiamine which are polymeric in character and not prepolymers as required by the claims of the instant application. This is evident from the Chemical Abstracts information for the reference that was provided by the Office, which refers to “3,3’,4,4’-Benzophenonetetracarboxylic dianhydride-bis(aminoethyl) ether copolymer” (emphasis added). Additionally, the examples section of the machine translation of the reference indicates that the aromatic tetracarboxylic dianhydride and alkylendiamine are reacted in 1:1 molar ratios. A worker of ordinary skill in the art would clearly appreciate that such stoichiometries are utilized when it is desired to form a relatively high molecular weight polymer by means of condensation polymerization of the reactants. That worker would not have found it obvious, and would not have had any incentive or motivation, to avoid such polymerization conditions so as to instead arrive at the polycarboxy-functionalized prepolymer of Applicant’s invention.

Applicant traverses the rejection of claims 1, 9, 10, 18, 19, 21, 22 and 24 under 35 U.S.C. Section 103(a) as being unpatentable over Japanese Patent No. 52-59700 (“Japanese ‘700”), Housel et al. (U.S. Published Application No. 2002/0183443, Gainer et al. (U.S. Pat. No. 4,966,920), Japanese Patent No. 11-349896 (“Japanese ‘896”),

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British Patent No. 1,256,267 and Japanese Patent No. 2003-113240 ("Japanese '240"). Reconsideration and withdrawal of the rejection are respectfully requested in view of the following remarks.

In Japanese '700, a polyester is prepared by polycondensing a polyalkylene glycol with trimellitic anhydride. The Chemical Abstracts information for this reference that was provided by the Office describes such reaction as a polymerization of polyalkylene glycols with trimellitic anhydride and the reaction product thereby obtained as "Polypropylene glycol – trimellitic anhydride copolymer" (emphasis added). As is the case with the other references relied on by the Examiner, it is clear that the starting materials are proposed to be copolymerized to form a polymer, rather than the prepolymer that is the subject of the claims currently under examination in the present application. For a claimed invention to be prima facie obvious under 35 U.S.C. Section 103 over a prior art reference, there must be some suggestion or motivation, either in the prior art reference itself or in the knowledge generally available to one of ordinary skill in the art, to modify the reference. The initial burden is on the examiner to provide some suggestion of the desirability of doing what the inventor has done. "To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references." *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). A prima facie case of obviousness under 35 U.S.C Section 103 thus has not been established in the present application, since the Examiner has not advanced adequate reasoning to support an argument of why a worker of ordinary skill in the art would have been led to modify the Japanese 700 teachings to avoid copolymerization of the reactants.

The Housel et al. reference (U.S. Published Application No. 2002-0183443)

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teaches “polymeric acid functional polyols [which] are reaction products of reaction mixtures including a base polyol having at least one of a terminal secondary and/or tertiary hydroxyl group and an aromatic anhydride” (Abstract; emphasis added). As noted previously in connection with the other cited references, the Housel et al. reference thus is clearly concerned with the preparation of polymeric materials and therefore would not suggest to a worker of ordinary skill in the art that he or she should depart from the reference teachings and instead combine the reactants in a way so as to obtain the polycarboxy-functionalized prepolymers invented by Applicant. In fact, the Housel et al. reference would actually discourage such a worker from making such a modification, in that a desirable property of the polymeric acid functional polyols is said to be an improved resistance to hydrolysis, which leads to greater dispersion stability. See the discussion at Paragraphs 0046-0050. In other words, one objective of the Housel et al. reference is to provide polymeric acid functional polyols which retain their polymeric character and resist hydrolysis into lower molecular weight materials. In view of this, what would have motivated a skilled worker to avoid achieving a relatively high molecular weight polymer during reaction of the base polyol and aromatic anhydride?

The Gainer et al. reference (U.S. Pat. No. 4,966,920) teaches the reaction of pyromellitic dianhydride and polypropylene glycol, wherein maleic anhydride can also be included as a reactant. However, the reaction products are described as “polyesters”, i.e., polymeric materials. According to the reference, the acid value of the polyester is less than 30 mg KOH/g, which provides further confirmation of the polymeric character of the reference polyesters since lower acid values will be associated with a higher degree of condensation of the starting reactants and thus a higher molecular weight.

For example, in the case of the model reaction previously discussed wherein two moles of trimellitic anhydride are reacted with one mole of PPG 425 (polypropylene glycol having a molecular weight of 425) to yield a polycarboxy-functionalized prepolymer in accordance with the present invention, the reaction product (the polycarboxy-functionalized prepolymer) will have an acid value of 139 mg KOH/g.

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Acid value may be calculated using the equation: $\text{Molecular Weight} = (56100 \times F)$ divided by Acid Value, wherein F is the number of carboxylic acid groups per molecule.

The Japanese '896 reference discloses a high molecular weight polyether polyester which is prepared by the chain extension of polyethylene glycol with a polybasic acid anhydride (Abstract). For the same reasons set forth previously with respect to the other references relied upon by the Office, such disclosure does not teach, suggest, nor make obvious the polycarboxy-functionalized prepolymers which are the subject matter of the claims presently under examination in the instant application.

British Patent No. 1,256,267 discloses polyesters of polycarboxylic acids having at least three carboxyl groups per molecule and a polyalkylene ether having at least two hydroxyl groups. In the working examples, 1:1 molar ratios of the two reactants are employed, typical of condensation polymerizations where the objective is to form a relatively high molecular weight polymer having a backbone containing a plurality of repeating units derived from the two starting reactants (comonomers). A worker of ordinary skill in the art would not have found it obvious to depart from such teachings and modify the reaction conditions so as to avoid polymerization and to obtain a polycarboxy-functionalized prepolymer of the type recited in Applicant's claims.

Japanese '240 teaches a composition containing, in addition to a crosslinking agent, a "polyethylene glycol pyromellitic dianhydride copolymer" having a number average molecular weight of 135,000, according to the Chemical Abstracts entry for this reference provided by the Office. Such high molecular copolymers, which contain multiple repeating units derived from polyethylene glycol, would not suggest to a worker of ordinary skill in the art the polycarboxy-functionalized prepolymers corresponding to the structure set forth in Claim 1 of the present invention, which are characterized by containing only one moiety per molecule derived from an active hydrogen-functionalized elastomeric polymer such as polyethylene glycol.

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In view of the above discussion, Applicant respectfully submits that the application is in condition for allowance and favorable consideration is requested.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Stephen D. Harper", is written over a horizontal line.

Stephen D. Harper
(Reg. No. 33,243)
Attorney for Applicants
610-278-4927

Henkel Corporation
Law Department
2200 Renaissance Boulevard, Suite 200
Gulph Mills, PA 19406